

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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IN THE APPLICATION OF:

J. L. SUMIEJSKI, C. D. TIPTON; & J. C. SMOGGIE

DOCKET No.: 3218R

CUSTOMER NUMBER: 26645

SERIAL NO.: 10/621,154

EXAMINER: S. COSTALES

FILED: JULY 13, 2003

GROUP ART UNIT: 1764

**TITLE: Transmission Lubricating Compositions with Improved Performance,  
Containing Acid/Polyamine Condensation Product**

Wickliffe, Ohio

Hon. Commissioner for Patents  
P. O. Box 1450  
Alexandria, VA 22313-1450

Declaration Under Rule 132

Sir.

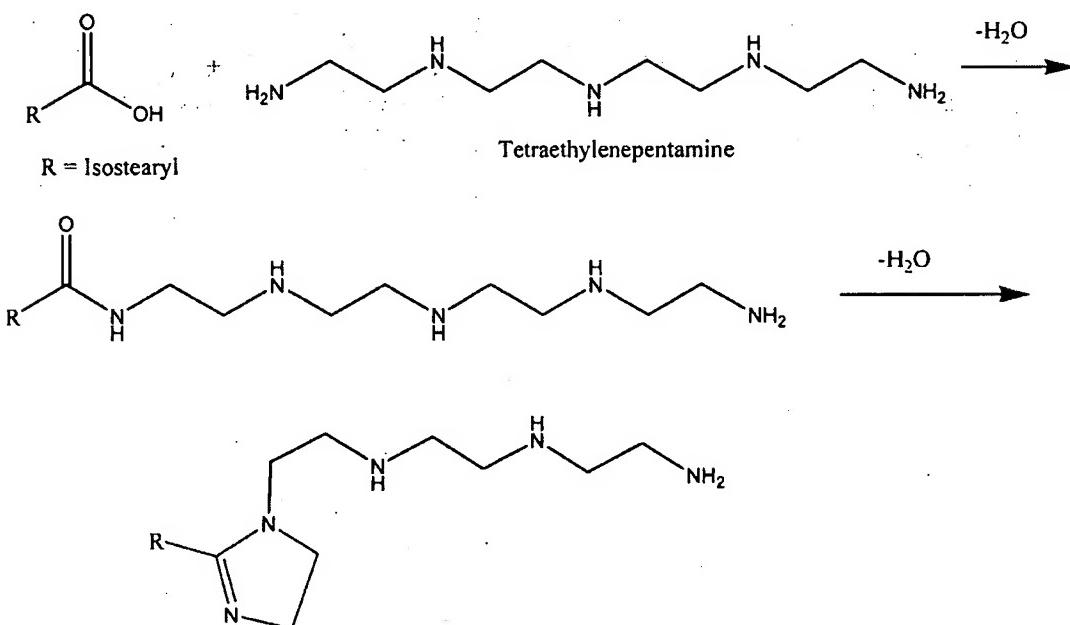
I, Richard Vickerman, declare as follows:

I received a Bachelor of Science degree in 1989 from Lawrence Technological University in Southfield, Michigan and both a Master of Science degree and Doctoral degree in the field of organic chemistry from Case Western Reserve University in 1996 and 1999, respectively.

I have been employed by The Lubrizol Corporation since 1990. From 2004 to 2006 I was a Technology Manager in the research division responsible for the development friction modifiers and corrosion inhibitors for the corporation. In 2006 I was promoted to Strategic Technology Manager for the driveline group of Lubrizol (including automatic transmissions). I am presently responsible for coordinating the long term research and development efforts for fundamental knowledge, new formulating components and new test development for lubricants for automatic transmissions, continuously variable transmissions, dual clutch transmissions, manual transmissions and farm tractors. As a result, I am very familiar with the invention claimed in the above-mentioned case and with the references which were used in the rejection thereof.

The examiner states that tributyl borate imparts antioxidant properties as per Farng. Farng uses tributyl borate as a reactant to make mixed hydroxylaryl-hydroxyester borates which are the claimed group of compounds in that reference. Alkyl borates, like tributyl borate, do not function as antioxidants.

The examiner states that the condensation product of isostearic acid + tetraethylenepentamine is not a member of formula III, hydrocarbyl imidazolines. This is incorrect. Our material is a combination of both imidazoline and amide species. The mechanism of formation of both amide and imidazoline from these two reactants is outlined below.



That is, the condensation product may be either the amide, as shown in the middle line, or the imidazoline, as shown in the last line, or a mixture of the two, depending on the severity of the conditions and extent of water removal.

The essence of the Declaration submitted on March 26, 2008 by Patterson is now resubmitted with modifications intended to more clearly define the problem being solved, the friction measurements reported as well as defining the required limits of these values under the Ford Mercon ATF specification.

In recent years, continuous slip/locking torque converter clutches (CSLTCCs) have been widely used in stepped automatic transmissions mainly to improve fuel efficiency. With the adoption of these devices the problem of "shudder" vibrations has arisen. The term "shudder" refers to an event that occurs in a vehicle equipped with a CSLTCC. Shudder

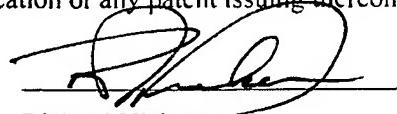
involves a high frequency vibration related to the stick-slip friction characteristics of the clutch system which is felt when driving at a constant speed in top gear when the CSLTCC locks up, stopping all relative motion within the unit. The vibration originates in the torque converter and is transmitted to the entire vehicle via the transmission/engine mounts. Shudder can be caused by improper frictional characteristics of the transmission fluid. To help alleviate this problem, Original Equipment Manufacturers (OEMs) require fluids to meet stringent friction standards. Ford, as outlined in its Mercon transmission fluid specification, requires a 20,000 Cycle Friction Durability Test. This test evaluates the frictional characteristics and friction durability over 20,000 clutch engagement cycles of an automatic transmission fluid. The frictional characteristics measured and their respective limits include:

- 1) Low Speed Dynamic Torque (S1) (a.k.a. Static torque or Quasi-static torque), which is defined as the highest value for torque obtained within the last 50 milliseconds (ms) of the engagement event.
- 2) Midpoint Dynamic Torque (D), which is defined as the mean of torques obtained during the 50 ms interval centrally located about the 1800 RPM speed.
- 3) S1/D ratio is required to fall within the range of 0.85 to 1.00 between 200 and 20,000 cycles of operation.
- 4) Static Breakaway Torque, which is defined as the torque measured 0.25 seconds after the beginning of the static engagement. This measurement must fall within the range of 0.090 and 0.140 between 400 and 20,000 cycles of operation.

Among the formulations tested and presented in the March 26, 2008 declaration, only the formulation containing the fatty acid/polyamine friction modifier showed acceptable performance. Its S1/D ratio remained in the range of 0.924 to 0.978 and the static coefficient remained between about 0.118 and 0.141. The closest other material, in terms of performance, was the oleyl amide of Comparative Example 3, and that exhibited several measurements of S1/D in excess of 1.0, indicating that torque increases at the end of the clutch engagement which can potentially cause shudder. Comparative Example 3 also showed poor green (break in) friction performance (values in excess of 1.0 continuing through 400-600 cycles). The most similar material in terms of structure, the imidazoline of Comparative Example 1, performed very poorly, exhibiting both a very low S1/D and static coefficient of friction.

As a result, I also conclude that, among the materials tested, only the fatty acid/amine condensate provided suitable coefficient of friction and antishudder performance at both beginning and end of test.

I further declare that all statements herein made of my own knowledge are true and all statements herein made on information and belief are believed to be true. I understand that wilful false statements and the like are punishable by fine or imprisonment or both (18 U.S.C. 1001) and may jeopardize the validity of the application or any patent issuing thereon.

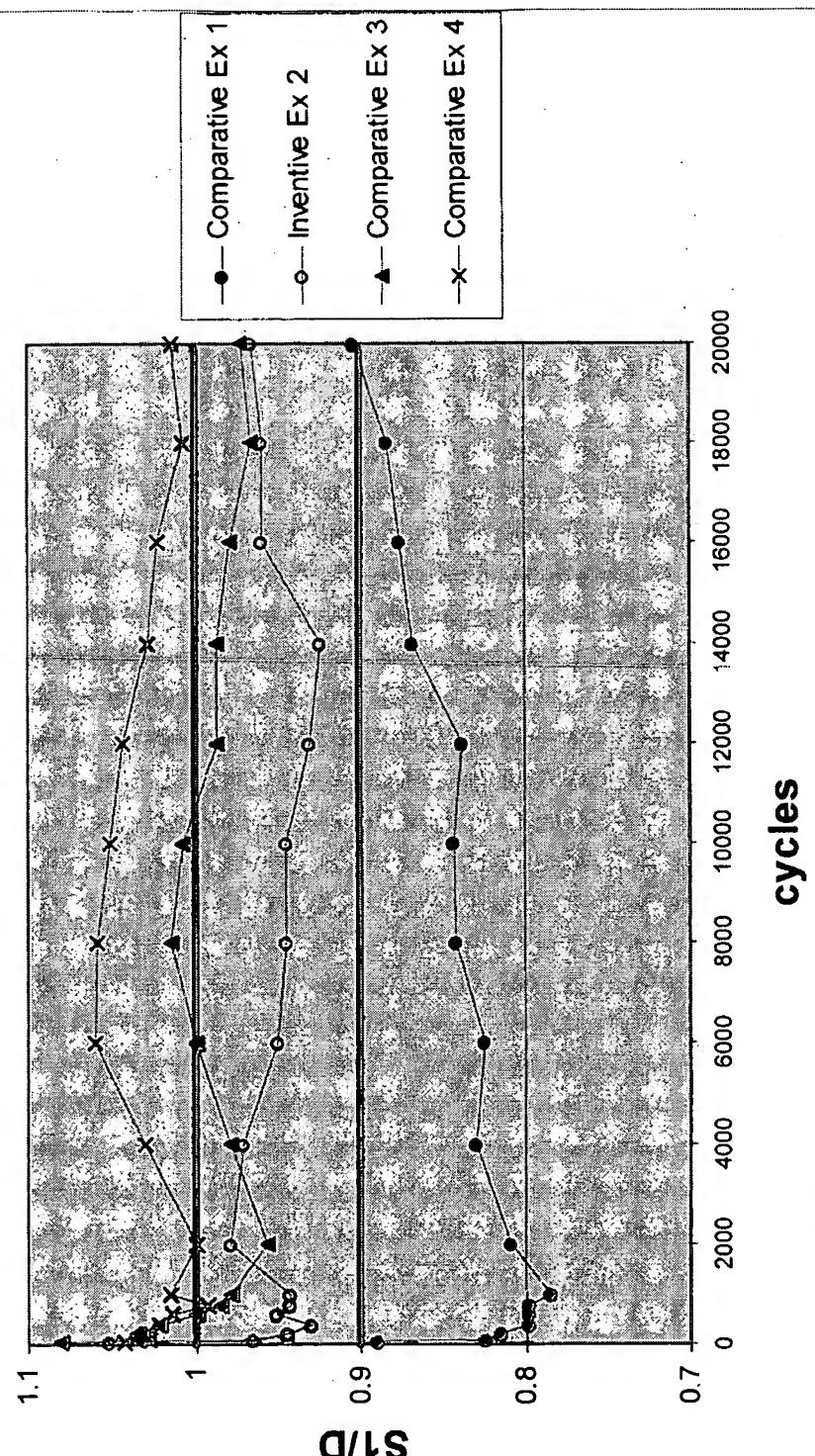


Richard Vickerman

10/6/08

Date

## Ford 20,000 Cycle Friction Durability Test



## Ford 20,000 Cycle Friction Durability Test

